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ScienceDirect

Procedia Computer Science 154 (2019) 26–32

Procedia Computer Science

www.elsevier.com/locate/procedia

8th International Congress of Information and Communication Technology, ICICT 2019

Knowledge Based Information System to Manage Transfer of Credits in An Outcome Based Higher Educational Setting

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Abstract

While shifting from one outcome based educational system to another one, a student needs to gain the benefit of credits transfer for all or most of his/her attained credits, followed by the policy and procedure of the granting institutions. Transfer of attained credits for a relocating student is quite normal and obvious in an outcome based higher educational system. With equal importance to transfer of credits, it is also vital to confirm that the knowledge and competency gained by the student does map the core skills needed for further progress in his/her education, in the receiving institution. In context to the field of Computer Science or Information Technology or any other related technical area, where programming languages and software platforms are imperative, the normal method of credits transfer could be a critical concern. On one hand, while the receiving institutions provide the transfer of credits for all or most of the courses successfully completed by a student, it is also a major concern whether the student occupies the core knowledge, competencies and skills needed to proceed with higher level courses, specific to software platforms or other specific requirements, in the receiving institution. This is because different institutions provide different curriculum for a similar program and thus, though the concepts may remain in general, the core software platforms or course related specific requirements may differ. In this case, with varying platforms from institution to institution, if a student is being received with transfer of credits but with lack of relevant knowledge, competencies and skills, he/she would face a critical challenge to cope up with the higher-level course, to succeed in the program. The competition within the institution may not allow the student to progress smoothly and could develop a sense of criticality or failure. With much needed effective solution to this problem, in our research, we have discussed the backdrops of normally executed credits transfer, addressed its complications as well repercussions and proposed a knowledge-based information system that would effectively tackle this problem. The outcome of the conducted research proposes to create a prototype of an information system tool to be identified as Knowledge Management Credit Transfer System in order to manage an efficient credits transfer process.

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1877-0509
10.1016/j.procs.2019.06.006

Keywords: Credits Transfer; Course Learning Outcomes; Knowledge and Skills; Software Platforms; Outcome Based Education System

1. Introduction and Statement of the Problem

Outcome Based Educational Systems (OBES) at the level of higher educational settings generally offer the flexibility for a student to transfer his/her credits, in case of change of an institution. This is followed by a pre-determined sequence of steps encoded by the institutions policies and procedures. Typically, the transfer of credits takes place from course to course and consumes a time ranging between four to eight weeks [1] from the date of receipt of all transcripts and relevant documents. Also, the courses that are not mapped to another course may be listed in unmatched set of courses which might be, but not necessarily, be evaluated for elective courses if any [1]. Alternatively, our proposed system considers transfer of credits based on each learning outcome of a course rather than a course to course equivalence. Likewise, since the system is automated, the students can see their pre-qualifications by entering their learning outcomes directly into the system much before the actual submission of their official documents to see their standings. Thus, the time required for transfer of credits through the proposed system would be much less in comparison to the normal practice of equivalences. Another issue of transfer of credits seen by most of the institutions is the period of any course completion whereby the institutions policy would mention a specific maximum period within which the student needs to have completed the course [2]. While our system in contrary measures the knowledge and skills through a proficiency test to attest the attained outcomes, thereby giving the benefit to the students' achievement of the past. While most of the institutions do provide the course equivalences and offer transfer of credits, but the one thing that is being unnoticed, in context to the field of Computer Science (CS) or Information Technology (IT) or Information Systems (IS) or other similar field, is the core software platform and the programming languages. It is well obvious that various higher educational institutions provide different curriculum for similar or differed programs. Even in case of similar programs the topics and contents of courses could vary from institution to institution. Generally, the courses in a program are prepared based on pre-requisite courses whereby a student needs to complete a course or a set of pre-requisite course/s before registering any higher-level course. It has been seen that most of the transferred students face difficulties in understanding the higher-level courses due to the fact that in most of the cases, the receiving institution offers varying software platform and progress the same platform as a continuation to the higher-level courses, whereas the transferred students may not have gained the needed skills in the platform. With the fact that courses with the same name at two different institutions do not mean that the courses are identical or that the credit transfer would take place [3]. For example, an institution offers a basic course in programming using Java in its first year of an undergraduate study. The second-year courses may continue using similar platform of Java to further extend and execute the concepts to an advanced level. The third-year advanced level course may solely depend upon the knowledge and skills gained in programming using the same platform Java to further enhance the skills to an expert mode. Alternatively, a student who has been granted transfer of credits to join the institution may have done the courses using a different platform say C++ programming language. Though the concepts may satisfy the requirement, but the platforms have changed. With the advantage of credits transfer, the transferred student may directly leap to few courses at the 2nd or 3rd year levels, being offered at an advanced level in the receiving institution, without having undergone the courses in the same institution but except for credits transfer. This process overlooks the core software platform and needed programming skills specific to a language. Similarly, this issue would withstand in other technical programs and courses. Though the concepts may remain mostly similar, but the contents and topics delivered in the higher-level courses at the receiving institution may require specific skills or competencies, not being considered in the credits transfers. Here comes the core problem where the need of a specific competency or skills is being overlooked, though the transfer of credits sustains.

Secondly, the traditional form of credits transfer is usually executed in the form of course to course level equivalences i.e. a course may be equalized to another course, or a group of courses may be equalized to a single

course, it all depends upon the type and nature of programs being offered by the sending and receiving institutions. Thus, it is obvious that the student will have to take the self-responsibility to choose the right program to minimize loss of credits [4]. It could be seen that the course equivalence procedures would always produce lapses to attest the consistency towards attainment of relevant knowledge and skills. Above all the existing course equivalence processes in most of the institutions consumes lot of time and effort as the student's credentials goes through various departments and colleges to attest the equivalences. A survey on students experience in this regard also demonstrates dissatisfaction in most of the cases [5].

The current process of equivalences may lead to several other complications too, such as:

The student may not receive equivalences for some of his/her eligible courses due to un match of learning outcomes from a whole course to another whole course of the receiving institution, irrespective of some learning outcomes been in line with courses. This is with the reason of few or least match, thus those learning outcomes remain out of the equivalence track.

The student may lose credits in transfer for those partial learning outcomes, as the course as a whole may not suffice enough to be matched to another course of the receiving institution.

The student may also lose credits in transfer where two or more courses may match to a single course at the receiving institution.

Followed by the transfer of credits, it may also be seen that a student may have received some equivalences for some higher-level courses at the receiving institution but with few lower level pre-requisite courses pending to be registered.

The student may face difficulties towards studying registered courses, since some core platforms may differ from institution to institution.

Lots of students as well the institutions time and efforts as well are wasted towards rigorous course equivalence procedures.

There could stand some differences in the consistency of credits transfer from a student to another student, as it all depends manually on the faculty member's judgment to provide equivalences.

The student may not have options to choose the right program as he or she does not have any information on what courses he/she is going to be exempted till the equivalences procedure is over.

To assess all the above situations and to effectually provide course credits transfer, our proposed system would centrally function to nullify the stated problems and issues, help the student as well the institution to successfully complete the credits transfer processes.

2. Proposed Knowledge Management informAtion System to Address Credits Traaansfer

With Information Technology in its utmost evolution, almost every complicated task could be effectively sorted out with the best feasible solution. Alongside with the growing impact of Knowledge Transfer processes, explicit or formal knowledge is easy to capture and store, could be shared with high degree of accuracy, effectively structured, patterned, categorized and evaluated [6]. We thus recommend a knowledge-based information system termed as Knowledge Management Credit Transfer System (KMCTS) to effectively transfer students' credentials by listing out each attained learning outcomes comprehensively in the structure of knowledge gained, skills obtained, competencies achieved and other specific components, in the form of defined rubrics mapped to the receiving institutions courses. The advantage is that the student will also gain credits for those partial skills that has been completed in the previous segment of any course and mapped to the learning outcomes of some of the courses in the receiving institution. The process will motivate those students too, who are willing to continue with their further studies after a long break but may not catch up due to the reason of loss of credits. With the fact that transfer students experience a decline in their performance immediately they join another institution [7] and more likely take further time to graduate in comparison to the naïve students [8]. This negative impact happens due to the academic difficulties experienced by students in the newly received institution [9]. Our proposed system recommends a proficiency test followed by fast track coverage of learning outcomes. The anticipated system would ensure that either way, transfer students are equipped with enough knowledge, skills and specific competencies before joining any program or course at the receiving institution. This would thereby reflect enhanced attainments, motivate and

amplify the transferred students' consciousness, without disrupting the learning processes. The process would improve self-perception and assurance which also contributes positively to the performance of transfer students [10].

3. Upper Level Architecture of the Proposed KMCTS System

Unlike traditional system of course equivalences whereby a course or set of courses are equalized to a single course, we recommend listing out all the learning outcomes attained by the student. As seen in fig. 1. titled "Upper Level Architecture of the Proposed KMCTS", the proposed system describes the layout on sequence of architecture. Followed by the submission of transfer credentials, the set of learning outcomes will be listed out in detail. A pre-format template of the format will stand as the basic structure for this list. The template would contain various aspects on the coverage of learning outcomes such as knowledge, general and specific skills, competencies, software platforms, and other specific competencies as derived by the experts at the receiving institution. The spread list of learning outcomes from the transferred institution will then be merged and sequenced and stand as a single combined list of outcomes. The combined list of learning outcomes will then be spread as a general list of outcomes to be mapped with individual course learning outcomes at the receiving institution. The derived output from mapping will then list out specific courses of the receiving institution with demonstrated percentage of mapping. Based on predefined criteria, the student will then be placed on a testing process and/or fast track learning processes to ensure attainment of learning outcomes. Based on the outcome of testing process, the courses will then be segregated into exempted or to be registered category.

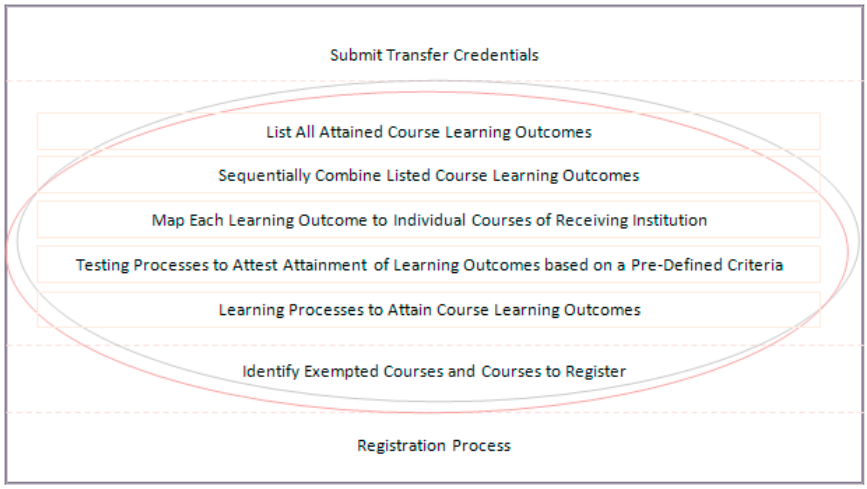

Fig. 1. Upper Level Architecture of the Proposed KMCTS System

4. Detailed Architecture of KMCTS

As seen in fig. 2. titled "Detailed Architecture of KMCTS", a benchmark percentage would have to be set, by the receiving institution, in advance to see that if the mapping match of a course is equal to or exceeds certain expectations, such as X% of similarity of learning outcomes would automatically lead to eligibility for exemption of a course. Simultaneously, if the mappings match for a course remains less than Z% then the course would fall into the registration category and alternatively the course where the mapping match remains at Y% which is less than X% and more than or equal to Z% would fall in the category to undergo a proficiency test to attest the attainment of learning outcomes or with an option for the student to undergo the pre designated learning process on a fast track learning outcomes coverage procedure.

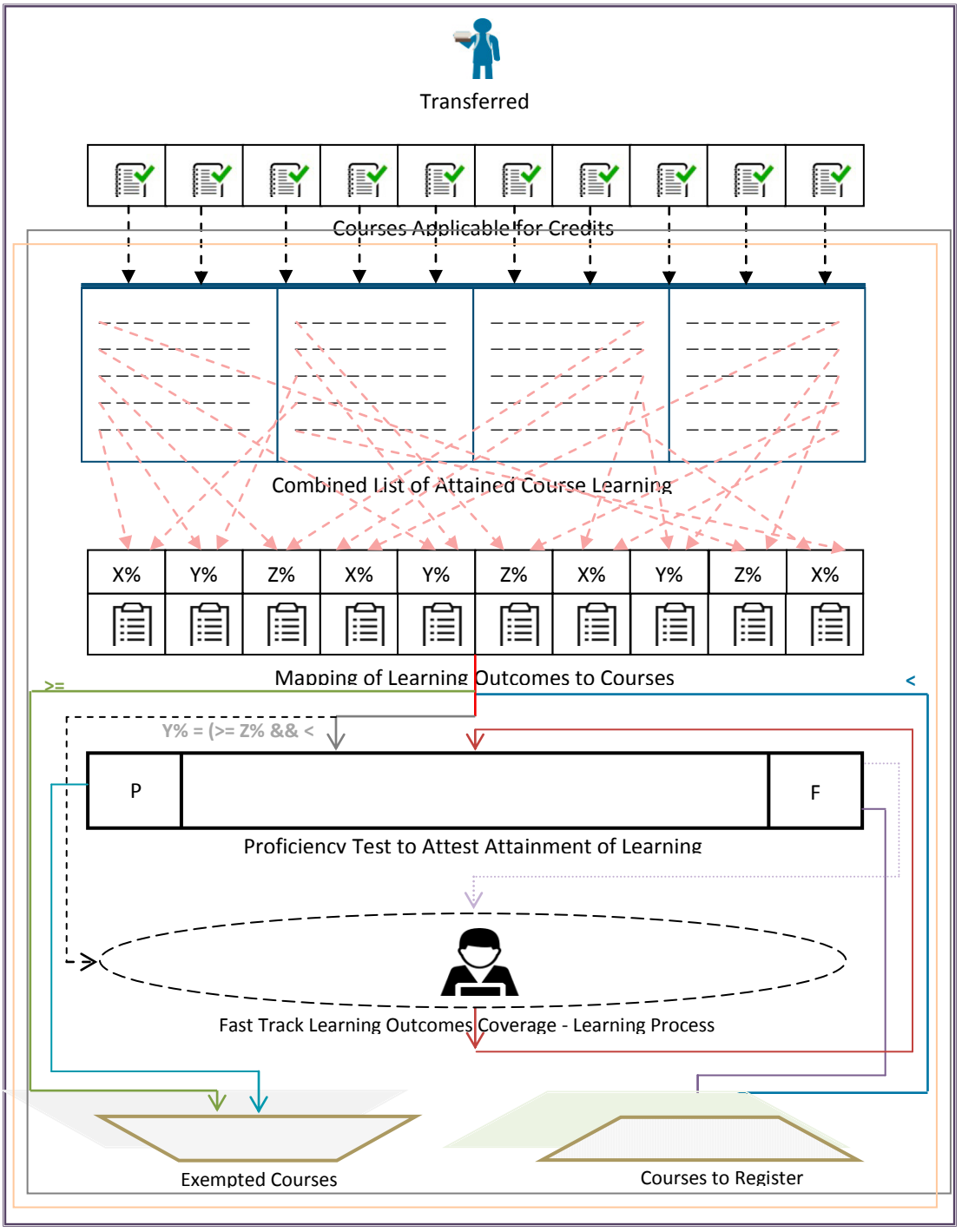

Fig. 2. Detailed Architecture of KMCTS

As seen in fig. 2., either way, the mapping match of Y% will enable to clear a proficiency test or join the fast track learning process and then clear the proficiency test, to be eligible for exemption in a course else the student would be obliged to register the courses as determined by the KMCTS system. Proficiency test would comprise of all the elements of learning outcomes that would be required to exempt any course at the receiving institution. The fast track learning process also focuses on the required learning outcomes much needed to be exempted from a course. Once the KMCTS system derives the exempted courses or the courses to be registered, the registration process would enable the student to choose and join a program. One of the major advantages of KMCTS system is that once the system derives the list of exempted courses, the student can choose to join the academic program of his/her own interest.

5. Advantages of the Proposed KMCTS

Both from students or the institutions perspective, the following advantages and benefits are expected:

The student would fairly get the benefit of even partially mapped learning outcomes in his/her attained outcomes

The student will not have any major challenges in continuing with pending courses as with this process, he/she would reasonably attested attainment of learning outcomes required in pre-requisite courses at the receiving institution.

As the system proposes centralization of the whole process, the students will save time and effort to go around offices to attest their course equivalences.

The proposed system ensures transparency and consistency of equivalences between different cohorts of students.

Students' achievements of the past, irrespective of any period of the course completion, will also be considered for equivalences and credits transfer through proficiency test.

In case of lack of required competency, knowledge and skills, the student will have an opportunity to further attest attainment of learning outcomes through fast track learning processes.

The institution could proceed with fair and effective delivery of courses with the assurance that the enrolled students are all at similar levels of achievement in the pre-requisite courses.

6. Conclusion

The proposed system is expected to address and manage various issues arising from the transfer of credits and equivalences of courses. The benefit to both the student as well the institution is anticipated. The purpose of the system is to enable the institution to fairly address the transfer of credits issues of any student. The proposed system must be developed into knowledge management information system software to automatically assess the outcomes and procedures as laid out in the research. Since the research work proposes an effective state of the art model, any relevant data and its visualization processes could be implemented only after the development of an appropriate software tool, which is considered as an extended vision to this work.

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